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Diagnosis and Management of Condensing Osteitis Associated with a Mandibula First Permanent Molar: a Case Report

Clarissa Irene Arif[1]*, Ickman Setoaji Wibowo[2], Prinitasya Zitta Amanda[3]

[1]Undergraduate Clinical Dental Student, Faculty of Medicine, Universitas Sriwijaya
[2,3]Lecturer, Department of Dentistry, Faculty of Medicine, Universitas Sriwijaya

*Correspondence author email : irenceclarissa60@gmail.com

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ABSTRACT

Background : Condensing osteitis is characterized by increased radiodensity resulting from localized alterations in bone architecture as a defensive response of host tissue to mild and chronic inflammatory stimuli. Accurate diagnosis of radiopaque jaw lesions is essential for determining appropriate treatment, as definitive diagnosis may require histopathological examination through bone biopsy.

Purpose : To report a case of condensing osteitis in the mandibular first permanent molar and emphasize the role of histopathological examination in establishing a definitive diagnosis.

Methods : A case report of a 16-year-old female presenting with residual roots of the right mandibular first permanent molar (tooth 46). Clinical examination, periapical radiography, and orthopantomography (OPG) were performed. Based on the clinical and radiographic findings, the provisional diagnoses were idiopathic osteosclerosis and condensing osteitis. The patient underwent open-method extraction of tooth 46 followed by enucleation biopsy of the alveolar bone. The excised specimen was submitted for histopathological evaluation.

Results : Clinical examination revealed that tooth 46 was covered by gingival tissue, with negative palpation and percussion findings. Radiographic evaluation demonstrated a well-defined, irregularly shaped radiopaque lesion in the interradicular bone of tooth 46. Histopathological examination of the biopsy specimen confirmed the definitive diagnosis of condensing osteitis.

Conclusion : Histopathological examination through biopsy remains indispensable for establishing a definitive diagnosis of radiopaque jawbone lesions and is crucial for differentiating condensing osteitis from other radiopaque conditions to ensure appropriate patient management.

***Keywords*:** Condensing osteitis, enucleation biopsy, radiopaque lesion

INTRODUCTION

Establishing an accurate diagnosis is essential for determining a proper treatment plan. Analysis of data obtained from patient's medical history, clinical examination, and diagnostic tests can be used to rule out differential diagnoses and establish a definitive diagnosis.[1] Radiographic examination is one of the most commonly used diagnostic tests in dentistry.[2,3] Radiopaque lesions are less frequently encountered than radiolucent lesions.[4] These radiographic findings may arise from various pathological bone conditions or even represent the superimposition of anatomical structures within the maxillofacial region.[4,5] Although

knowledge of the clinical and radiographic characteristics of osseous pathologies is often sufficient to narrow the differential diagnosis, bone biopsy remains necessary to obtain an accurate diagnosis and the most appropriate treatment approach.[1,5]

Condensing osteitis, also known as focal sclerosing osteomyelitis, is characterized by increased radiodensity resulting from localized alterations in bone structure as a defensive response to mild and chronic inflammatory stimuli.[6,7] Several etiological factors have been associated with condensing osteitis, including deep dental carious lesions, teeth with extensive restorations, inadequate root canal treatment, and occlusal trauma.[3,8,9] Radiographically, condensing osteitis typically presents as a uniform radiopaque mass at the periapical aspect of the root apex, exhibiting well-defined borders and a gradual transition into the surrounding bone, and it may also be accompanied by the loss of the lamina dura and widening of the periodontal ligament space.[8] The radiographic appearance of condensing osteitis closely resembles idiopathic osteosclerosis or dense bone island (DBI), therefore, histopathological examination is often required for definitive differentiation.[5,10] Histopathologically, condensing osteitis is characterized by the formation of dense trabecular bone within the marrow spaces, resembling compact bone, frequently accompanied by areas of fibrosis and occasionally inflammatory cell infiltration.[7,10]

Condensing osteitis is generally asymptomatic and is often detected incidentally during routine radiographic examinations.[10] Nonetheless, an accurate diagnosis of condensing osteitis is crucial, as it may be associated with potential complications, underlying chronic inflammatory processes, and future treatment consideration.[9] This report presents a case of a female adolescent with a radiopaque lesion in the interradicular bone of the right mandibular first permanent molar, diagnosed as condensing osteitis and confirmed by histopathological examination.

RESULTS

A 16-year-old female presented to the Dental and Oral Hospital in South Sumatra with a complaint of discomfort associated with the right mandibular first permanent molar. The patient reported a history of an attempted extraction three months prior, however, the procedure was unsuccessful due to severe pain. The patient had no significant history of systemic disease. According to the patient, the right mandibular first permanent molar had been carious for approximately four years, with progressive enlargement of the cavity over time, which eventually led to the failed extraction attempt. Intraoral examination revealed the presence of mesial and distal retained roots of tooth 46 covered by the gingival tissue (Figure

1a), with negative responses to palpation and percussion tests. Periapical radiographs and an orthopantomogram (OPG) revealed a well-defined, irregularly shaped radiopaque lesion in the interradicular bone of tooth 46 (Figures 1b, c). Based on these radiographic findings, the provisional diagnoses were idiopathic osteosclerosis and condensing osteitis. The treatment plan for this case was an open-method extraction of tooth 46, followed by an enucleation biopsy of the alveolar bone of tooth 46.

Figure 1. (a) Clinical presentation of the retained roots of tooth 46, (b) Periapical radiograph, (c) Orthopantomogram.

The procedure was performed under local anesthesia using a mandibular nerve block and buccal nerve infiltration. A full-thickness triangular flap was started with an intrasulcular incision from the mesial aspect of tooth 47, followed by a vertical releasing incision at the distal aspect of tooth 45. The flap was carefully reflected using a periosteal elevator (Figure 2a). Buccal bone reduction was performed using a round bur on a low-speed handpiece. The mesial and distal retained roots of tooth 46 were elevated and extracted (Figure 2b). Subsequently, an enucleation biopsy of the alveolar bone of tooth 46 was performed (Figures 3a, b) using round and straight-tapered burs on a low-speed handpiece.

Figure 2. (a) Flap reflection using a periosteal elevator, (b) Mesial and distal retained roots of tooth 46 following surgical exposure

The bone specimen, measuring 0.6 cm x 0.2 cm x 0.1 cm (Figure 3c), was placed in a container filled with 10% formalin and submitted to the Anatomical Pathology Laboratory for histopathological evaluation. The extraction socket was thoroughly curetted, and sharp bone edges were smoothed using a bone file. A surgical sponge was then placed into the socket of tooth 46, and the full-thickness mucoperiosteal flap was repositioned to its original position, and sutured using single interrupted technique with a non-resorbable silk suture (Figure 4). The patient was prescribed antibiotics, analgesics, and anti-inflammatory medications consisting of Amoxicillin 500 mg tablets, Ibuprofen 400 mg tablets, and Methylprednisolone 8 mg tablets. Post-operative instructions and medication use were provided, and the patient was scheduled for a follow-up one week later.

Figure 3. (a) Surgical site before alveolar bone biopsy, (b) Surgical site after alveolar bone biopsy, (c) Alveolar bone specimen measuring 0.6 cm x 0.2 cm x 0.1 cm.

Histopathological examination revealed compact bone tissue with normal osteocytes surrounded by fibrocollagenous connective tissue, infiltrated by lymphocytes and plasma cells, and no signs of malignancy were found. These findings confirmed the definitive diagnosis of condensing osteitis. At the one-week follow-up visit, subjective and objective examination demonstrated favorable tissue healing, absence of inflammation, and no complaints of pain. The sutures were removed, and the socket was irrigated using a saline

solution mixed with povidone-iodine (Figure 5).

Figure 4. Closure of the flap using single interrupted technique with non-absorable silk sutures.

Figure 5. Clinical follow-up examination one week postoperatively.

DISCUSSION

Condensing osteitis represents a defensive osseous response to irritation or infection.[8] Teeth with condensing osteitis are typically associated with chronic irritation resulting from infection (such as extensive dental caries, root canal therapy, large restorations, and periodontal disease) or mechanical stress (occlusal trauma).[8,11] One of the etiological factors of condensing osteitis is chronic irritation caused by low-virulence bacteria within a necrotic pulp combined with a robust host immune response which stimulates increased bone formation.[8,12] This process results in a radiopaque appearance observed on radiographs.[10]

Condensing osteitis is a relatively common radiopaque lesion, affecting approximately 4–7% of the general population, with a higher prevalence in females than males.[3,4,10] Yeh et al.[8] reported that condensing osteitis predominantly affected females, with a female-to-male ratio of 1.9 : 1 in a Taiwanese population.[8] Similarly, Al-Habib[11] reported that 81.8% of condensing osteitis cases occurred in females, compared to only 18.2% in males within a Saudi Arabian subpopulation.[11] This sex predilection has been linked to female hormones that influence bone metabolism, such as estrogen, which plays an important role in bone maturation and the regulation of bone turnover.[8,11]

Condensing osteitis is also more prevalent in children and young adults.[6,10,12] Abdelhafeez[9] reported that females in the age groups of 10–19 years and 30–39 years exhibited the highest incidence of condensing osteitis in Qassim, Saudi Arabia.[9] The 16-year-old female patient presented in this case aligns with the demographic trends reported in these previous studies.

The mandibular permanent first and second molars represent the most common sites for the occurrence of condensing osteitis.[1,3,4] The high incidence of dental caries, occlusal trauma, and pulpal infection in posterior teeth compared to anterior teeth serves as the main factor contributing to the higher prevalence of condensing osteitis in the molar region.[8,11] Furthermore, the prevalence of condensing osteitis is significantly higher in the mandible than in the maxilla. This difference may be attributed to anatomical variations in bone structure, vascular supply, and osseous architecture between the two jaws. On an orthopantomogram (OPG), superimposition of anatomical structures occurs more frequently in the maxilla than in the mandible, which can obscure operator visibility and hinder the detection of conditions resembling condensing osteitis.[7,11] This is consistent with the study by Yeh et al.[8], which reported that 54.7% of condensing osteitis cases were located in the mandibular first permanent molar, while 28% were found in the mandibular permanent second molar.[8] Additionally, Al-Habib[11] reported that condensing osteitis and idiopathic osteosclerosis were exclusively detected within the mandible in a Saudi Arabian subpopulation.[11]

Condensing osteitis is generally asymptomatic and is usually discovered as an incidental finding during routine radiographic examinations.[10] Radiographically, condensing osteitis manifests as a uniform radiopaque mass around the periapical region of the affected tooth, characterized by well-defined borders, and occasionally associated with the loss of the lamina dura and widening of the periodontal ligament space.[1] However, several other radiopaque lesions associated with increased bone formation in the jaws may present with similar radiographic features, making differentiation from condensing osteitis essential.[8]

Idiopathic osteosclerosis, or dense bone island, represents a principal differential diagnosis for condensing osteitis.[7,8] Idiopathic osteosclerosis is characterized by increased bone density unrelated to inflammatory, neoplastic, or systemic diseases, and its etiology remains unknown.[3,7,8] Similar to condensing osteitis, idiopathic osteosclerosis is typically asymptomatic and is frequently identified in the mandibular molar region.[3,7,8,13] While idiopathic osteosclerosis exhibits radiographic features that closely mimic condensing osteitis, the key differentiating factor is that idiopathic osteosclerosis lesions are generally separated from the root apex, and the adjacent teeth are usually vital.[11,12] This distinction exists because idiopathic osteosclerosis is considered a developmental condition of normal bone and is commonly regarded as an anatomical variant, thereby rarely showing any correlation with pulpal irritation.[7,10,11] Although radiographic examination is often sufficient to differentiate between condensing osteitis and idiopathic osteosclerosis, certain cases may present overlapping characteristics, making differentiation challenging. In such situations, a

bone biopsy and histopathological examination are required to establish a definitive diagnosis.[13,14]

Histopathologically, condensing osteitis is characterized by alterations in normal bone remodeling, in which the bone marrow is replaced by fibrous connective tissue and dense trabecular bone formation within the marrow spaces resembling compact bone, and is occasionally accompanied by inflammatory cell infiltration.[7,10] In contrast, idiopathic osteosclerosis typically demonstrates dense lamellar bone with reduced marrow spaces and an absence of inflammatory cell infiltration.[15] Tsvetanov[1] reported a case that was clinically and radiographically suggestive of condensing osteitis, however histopathological examination ultimately established a definitive diagnosis of idiopathic osteosclerosis.[1] In the present case, an enucleation bone biopsy followed by histopathological evaluation confirmed the definitive diagnosis of condensing osteitis.

An accurate diagnosis is essential for selecting the most appropriate treatment, ensuring favorable and satisfactory outcomes.[5] Condensing osteitis generally has a good prognosis. However, in certain cases it may result in root resorption, tooth impaction, and tooth displacement.[1,10] Ustad et al.[7] reported a case of root resorption associated with condensing osteitis involving a permanent maxillary first molar.[7] Although no root resorption caused by condensing osteitis was observed in this patient, timely intervention was considered necessary to prevent potential complications.

The management of condensing osteitis primarily focuses on eliminating the source of chronic irritation associated with the affected tooth, either through endodontic treatment or tooth extraction.[3,6,12] In cases involving large lesions, complete removal of the pathological bone in conjunction with extraction of the affected tooth is often indicated.[10] Tissue specimens obtained through enucleation or curettage should be submitted for histopathological examination to confirm the diagnosis and guide further management.[16]

CONCLUSION

This case highlights the importance of a comprehensive patient evaluation, including medical history, thorough clinical examination, and adjunctive diagnostic aids such as radiographic and biopsy examinations in establishing an accurate diagnosis of jaw bone lesions so that appropriate treatment can be planned. Ultimately, a definitive diagnosis of jaw bone lesions is established through histopathological examination.

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